

## ABSTRACT OF THE DISCLOSURE

Methods and apparatus for transferring data segments of a data stream across multi-channel links in a high-capacity network, so that the segments are equitably smeared across the channels of each multi-channel link, are described. The high-capacity network comprises a multiplicity of distributed high-capacity edge nodes interconnected by multi-channel links to a plurality of core nodes. Each edge node comprises a source node and a sink node which may share memory and control. A path from a source node of a first edge node to a sink node of a second edge node traverses two links, a first link from the source node to a selected core node and a second link from the selected core node to the destination sink node. Tandem switching through an intermediate edge node is not required, even for data streams of very low bit rate.

Two types of core nodes are described. A core node of a first type is constructed as a high-capacity single-plane switch. A core node of a second type is constructed as a very-high capacity multiple-plane switch. Accordingly, traffic-load balancing across each multi-channel link in the network is realized by a data smearing process that is tailored to the core node type. A first-order data smearing method that balances the traffic loads among the channels of a first multi-channel link in a two-link path is used in conjunction with said first-type core nodes. A second-order data smearing method that balances the traffic load of each data stream across the channels of both links in a two-link path is used in conjunction with said second-type core nodes.

Both first-order and second-order smearing methods are exercised at each source node, and the core nodes, regardless of their type, perform rudimentary tasks and are deliberately kept devoid of quality-control capability.